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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,299	06/13/2001	Dinesh Chopra	MI22-1747	7028

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EXAMINER

CAO, PHAT X

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 01/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/881,299

Applicant(s)

Chopra et al.

Examiner

Phat X. Cao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Sep 10, 2001
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 47-54 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 47-54 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 3
- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

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DETAILED ACTION

Claim Objections

1. Claim 47 is objected to because of the following informalities: in claim 47, line 4, a phrase "within the first metal comprising layer" should be changed to "within the layer comprising the first metal". Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

3. Claims 47-53 are rejected under 35 U.S.C. 102(e) as being anticipated by Fukada et al (US. 6,107,687).

With respect to claims 47-52, Fukada, in Figs. 8-9 and related text, discloses an integrated circuit comprising: a semiconductor substrate 10 (10 not shown in Figs. 8-9, see Fig. 7); a layer 4 comprising a first metal of copper over the substrate; a layer 8 of CuTi alloy material (column 7, lines 9-13) within the layer 4 comprising the first metal, the CuTi alloy material layer 8 comprising the first metal of copper and a second metal 5 of titanium different from the first metal, wherein

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the CuTi alloy material is less susceptible to formation of metal oxide compared to the first metal of copper (column 2, lines 44-47); and a conductive connection 6 on the alloy layer.

With respect to claim 53, Fukada further discloses that the CuTi alloy layer 8 is formed by entirely converting the Ti layer 5 having a thickness of 30 to 500 angstroms (column 5, lines 1-2) into reaction layer.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 47-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over You et al (US. 6,147,000) in view of Aoyama et al (US. 5,592,024).

With respect to claims 47-51 and 54, You, in Fig. 10 and related text, discloses an integrated circuit comprising: a semiconductor substrate; a layer 92 comprising a first metal of copper over the substrate; and a layer 100 of CuTa alloy material within the layer 92 comprising the first metal (column 6, lines 58-64), the CuTa alloy material layer 100 comprising the first metal of copper and a second metal of Ta different from the first metal, wherein the CuTa alloy material is less susceptible to formation of metal oxide compared to the first metal of copper.

You does not disclose a conductive connection formed on the alloy layer 100.

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However, Aoyama, in Fig. 25E, teaches the obviousness of forming a multilevel interconnection having the conductive connection 134 on a cap layer 131 of an interconnect 129. Accordingly, it would have been obvious to form the conductive connection on the alloy layer 100 of You in order to form the multilevel interconnection.

With respect to claim 53, You further discloses that a portion of the second metal layer 94 having a thickness of about 50 - 500 angstroms is converted into the alloy layer 100 (column 8, lines 33-37 and column 6, lines 58-65).

With respect to claim 52, You further discloses the obviousness of forming a CuTi alloy layer 15 (column 5, line 40) comprising the first metal of copper and the second metal of titanium. According to You, the CuTi alloy layer would also provide a highly reliable passivated copper interconnect member without increasing the RC of the copper interconnect member (column 3, lines 17-20).

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phat X. Cao whose telephone number is (703) 308-4917. The Examiner can normally be reached on Monday through Thursday. If attempts to reach the Examiner by telephone are unsuccessfully, the Examiner's supervisor, Olik Chaudhuri, can be reached on (703) 306-2794.


Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. Group 2800 fax number is (703) 308-7722 or (703) 308-7724.

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PC
December 30, 2001


PHAT X. CAO
PRIMARY EXAMINER